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WAR FOOD ADMINISTRATION
Food Distribution Administration
Processed Products Standardization
and Inspection Division

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INSPECTORS' INSTRUCTIONS

GRADING OF CANNED PEAS

PRODUCTION

The annual pack of canned peas has varied from approximately 10,566,968 cases to approximately 25,458,647 cases; the fluctuation occurring largely from anticipated demand or influenced by climatic conditions. The most important producing states are Wisconsin, Oregon, Washington, New York, Minnesota, Illinois, and Utah. (1)

There are two distinct horticultural types of canned peas -- the EARLY type and the SWEET type. The early type is often referred to as Early June (as this type matures earlier in the season than the sweet type) and also as Alaska variety. The principal varieties of early type peas are the Alaska and Little Gem. The sweet type peas mature later in the season than the early type and are often called Sugar peas or Sweet Wrinkled peas. The chief varieties of sweet type peas are Perfection, Sunrise, and Market Garden. Certificates of grade should indicate the type of peas examined - either EARLY type or SWEET type. (2)

There is little difficulty in distinguishing the two types as each type has noticeable characteristics. Early type peas are more spherical in shape and in the larger sizes are more firm than sweet peas. Sweet type peas are slightly oval in shape and tend to wrinkle when they become dry. Another important distinguishing characteristic is flavor and odor. Early type peas have a more starchy flavor in their later stages of maturity than sweet peas whereas sweet peas have a definite sweet flavor and odor. (3)

Early type peas tend to rupture transversely to the hypocotyl without much appreciable change in color as they mature. Sweet type peas do not rupture in their later stage of maturity but the peas may turn to a creamy-white, yellow, or brown color. (4)

Increasing amounts of large garden varieties of ("Profusion Type") sweet peas are being canned but are readily recognized by their definite sweet flavor, by their odor, and by their tendency to turn white, yellow, or brown as they advance in maturity. (5)

PREPARATION AND CANNING

The harvesting of peas for canning is timed by growers to obtain a yield that will be more profitable, either from a standpoint of volume and weight or size and quality. The fields are inspected daily so that the vines may be cut when the peas reach the stage of maturity desired. Peas that show a high percentage of the very immature, smaller sizes bring a higher price which will usually offset the price received for a larger quantity of more mature, larger size peas. (6)

The vines are cut with a machine similar to a mowing machine and are hauled to the nearest vining station. Viners are placed at vining stations near the fields or at the plants. The viners perform the work of "threshing" the peas from the pods. The shelled peas are generally placed in shallow, perforated wood boxes and hauled from the viner station to the factory as quickly as possible as any delay in getting the shelled peas to the factory may cause changes in quality. (7)

The peas are prepared for the canning operation by first passing through a blow-type cleaner to remove as much extraneous material as can be removed by this method and are then washed, generally in a rotating cylinder type washer. (8)

After this preliminary step of cleaning and washing, and sometimes before washing, the peas pass through a sizing machine and are graded for size if the canner desires to grade for size. (9)

Many packers make a brine separation of the peas in order to divide the raw product into quality classifications. In a salt brine of proper specific gravity, peas of higher quality will float and those of lower quality will sink. Mechanical testers to determine maturity of peas before processing are on the market and are used by many canners as an index to quality. The accuracy of mechanical testers has, however, not been fully determined. (10)

The sorting of the peas to remove pieces of pod, spotted, or discolored peas is done on conveyor belts. (11)

Blanching of the peas is the next step and the common type of blancher used is a perforated cylinder revolving inside a larger cylinder containing a constant stream of fresh water heated by steam. The time of blanching ranges from 1-1/2 minutes to 4 minutes depending upon the size of the peas. Sometimes the blanching is prolonged if the peas are hard. (12)

Another washing, following blanching, is the usual procedure. Cold water is generally used for the smaller size cans and hot water is used for peas to be packed in No. 10 size cans to increase the temperature before the cans are filled. (13)

Generally, peas are heated before entering the filling machine and a boiling brine composed of salt, sugar, and water is used as a packing medium. The filled and sealed cans are placed into circular crates and are cooked in retorts under pressure at the proper temperature depending upon the size of cans and length of cook. Occasionally peas are "vacuum packed" and contain no packing medium. (14)

Cooling of the cans follows the cooking to prevent injury to the contents. (15)

GRADING

As with other canned commodities, code marks and the can size are carefully noted on the score sheet, and net weights and vacuum readings are taken. The type and sieve size as well as the brand name on the label should be shown on the score sheet. (16)

Before pouring off any liquor, determine whether or not each can meets the standard of "fill of container for canned peas." Unlike many other commodities, the fill of container requirement for canned peas is not based on a "head space" allowance of not to exceed 10 percent of the total inside height of the container. (17)

Fill of Container for Canned Peas

Canned Peas shall be considered standard in fill if the container is so filled that, when the peas and liquid are removed from the container and returned thereto, the leveled peas (irrespective of the quantity of liquid), 15 seconds after they are so returned, completely fill the container. A container with lid attached by double seam shall be considered to be completely filled when it is filled to the level $3/16$ -inch vertical distance below the top of the double seam; and a glass container shall be considered to be completely filled when it is filled to the level $1/2$ -inch vertical distance below the top of the container. (18)

Canned peas that do not meet the fill of container requirement for canned peas shall be certified as "Below Standard in Fill". (19)

Determination of Size

The various sizes of peas are described in the U. S. Standards for Grades of Canned Peas. The size of a pea is the diameter of a mesh through which the pea will pass without any appreciable force. In sizing peas the smaller diameter of the pea should be the one considered. An estimate by count of the percentage of sizes found upon examination should be recorded and the sizes found certified as: (20)

No. 3, No. 4, and No. 5 sizes mixed (mostly No. 4 sieve)

Synonymous terms frequently used by the trade for designating the sizes of peas are: (21)

No. 1 size - Tiny
 No. 2 size - Extra Sifted
 No. 3 size - Sifted
 No. 4 size - Early June, or Sweet
 No. 5 size)
 and)- Telephone
 No. 6 size)

The term "ungraded for size" usually denotes a mixture of all sizes and is often misused in denoting three consecutive sizes. If two or more sizes of peas are packed together they are generally referred to as "blends". If all sizes are included, the certification shall be -- "Ungraded for Size". (22)

Frequently the packer may pack a "blend" of two or more sizes such as Nos. 2, 3 and 4, or Nos. 3 and 4 "blend". (23)

Clearness of Liquor

Before taking the vacuum or opening to determine the fill invert the can of peas if it has stood for any appreciable length of time. (24)

Record the vacuum and determine the fill on all samples that might be questionable as to being well filled. (25)

Pour all the liquor into a standard cylinder (1-1/4 inches in diameter and 10 inches in height). (26)

The clearness of liquor is immediately determined. It is helpful to observe the outline of the inspector's fingers through the cylinder when held toward the light. The scopometer, when available, is helpful to adjust the inspector's judgment. (27)

The factor of "clearness of liquor" should be scored as follows: (28)

Classification	Score	Points	
	10		If the liquor is as clear as fresh water, except for slight tint of green
A	9	"practically clear"	If, in addition to the green tint, a very slight cloudiness is present
	8	"reasonably clear or cloudy"	If the cloudiness is moderate and light in color
B	7	"small quantity of sediment"	If, in addition to this moderate cloudiness, a film of sediment settles
	6	"very cloudy"	If the cloudiness appears as a dull yellow or other dull color
C	5	"noticeable sediment"	If, in addition to this cloudiness, a pronounced quantity of sediment is present
	0-4	"extremely cloudy, considerable sediment, or off color"	If the liquor is viscous (sticky or almost semifluid), together with a great deal of sediment, or off color (brown)
D			Liquor that falls into this classification is usually a result of some other factor, such as maturity, and the product shall be certified as Off-Grade, regardless of the total score for the product.

Uniformity of Color

The factor of uniformity of color pertains to the uniformity of the proper color of peas and not the intensity. Peas that possess a dull brown-green, yellow-green, or creamy white-green cast cause a variation from the proper color and must be scored accordingly. Peas that are definitely brown or creamy-white in color are considered under the factor of defects as "discolored". "Vivid-green" (sour) peas are also considered as defects, unless they are artificially colored. (29)

If peas are artificially colored and this fact can be positively identified by the inspector, the peas fall below the standard of quality under the Federal Food, Drug, and Cosmetic Act in this respect only, they shall be certified as "Below Standard in Quality - Artificially Colored". (30)

Score the factor of "uniformity of color" as follows:

(31)

Classification	Score	Points	
	15		If practically all peas are uniformly green with no variation from the general typical color
A	14	"practically uniform, typical"	If not more than approximately 5% by count are lighter or darker than the general color
	12-13		If approximately 5% to 8% by count are lighter or darker than the general typical color
B	11	"reasonably uniform, typical"	If approximately 8% to 10% by count are lighter or darker than the general typical color
	9-10		If approximately 10% to 15% by count are lighter or darker than the general typical color
C	8	"variable but typical"	If approximately 15% to 20% by count are lighter or darker than the general typical color
	7	"markedly variable or off color"	If more than 20% by count are lighter or darker than the general color, with a dull brown-green or yellow-green cast
D			Peas that fall into this classification shall be certified as Off-Grade, regardless of the total score for the product.

Absence of Defects

The defects found in peas are broken peas (including loose skins), spotted or otherwise discolored peas, insect injury and extraneous (or foreign) material. (32)

Splits in peas caused by shelling are usually known as mechanical splits and are not considered "ruptured"; their presence in a product is negligible and should not be considered as a defect. Since the standard of quality under the Federal Food, Drug, and Cosmetic Act does not differentiate between "mechanical splits" and "ruptured peas" (often referred to as maturity splits), "ruptured" peas are considered under the factor of maturity. (33)

The pea seed is considered unbroken if the two cotyledons are still held together by the skin even though the cotyledons may be cracked or partly crushed, or the skin split. Each major portion of a skin or cotyledon not included in the above definition is considered a "broken" pea; thus loose skins are considered as broken peas. (34)

Loose skins are skins from which the cotyledons are completely removed. (35)

Spotted peas are easily distinguished even though the brown or yellow-brown spotted areas are small. (36)

Discolored peas are peas which do not have a proper green hue, (37)

which are a vivid green or other off-color. Creamy-white or brown colored peas are considered "discolored" peas.

Extraneous (or foreign) material is any piece of vegetation, mineral, or object that is not a pea. Extraneous material includes pea pods, leafy material, stems, thistle buds, and buds or seeds from other plants, but such matter is considered "harmless extraneous vegetable material." If any other than "harmless" extraneous (or foreign) material allowed in the standards is present the grade statement shall be "Grade Not Certified, Account Presence Foreign Material."

(38)

Score the factor of "absence of defects" as follows:

(39)

Classification	Score Points		Harmless extraneous material	Spotted Discolored insect or other injury	Broken Peas (or loose skins)
			Based on Drained Weight	By Count	By Count
					(except *)
					No. 1&2: Other sizes
A	30	"practically free"	0	0	1% - 2%
	29		0	1/4%	3%
	28		0	1/2%	4%
	27		0	1/2%	5%
	26		1/4%	1%	5%
B	25	"reasonably free"	1/4%	1-1/2%	5%
	24		1/4%	1-3/4%	5%
	23		1/4%	2%	5%
	22		1/2%	2-1/2%	6%
C	21	"fairly free"	1/2%	3%	7%
	20		1/2%	3-1/2%	8%-9%
	19		1/2%	4%	10%*
					(by weight)
	0-18		More than 1/2%	More than 4%	More than 10%
D		peas that fall into this classification shall be certified as OFF-GRADE, together with the applicable statement.	"Excessive foreign material"	"Excessive discolored peas"	"Excessive broken peas"

If extraneous material or an excessive amount of broken peas are evident when the peas are emptied on the grading tray a fairly accurate drained weight may be determined at that point for determining these factors.

(40)

Weevil

Peas are occasionally found infested with weevil. This defect can be recognized as a small dark spot on the peas, often no larger than the point of a pin. By carefully folding the skin back from the tiny spot the larvae may be seen embedded in the cotyledon.

(41)

If peas are found infested with weevil consult the supervising inspector.

(42)

Maturity

As peas approach maturity, there is a tendency of the peas to become "mealy". This mealiness is more pronounced in early type peas than in sweet peas and becomes excessive when the insoluble solids content is such that the peas have an undesirable starchy texture when eaten. Mealiness and insoluble solids content are directly correlated and the determination of the insoluble solids gives an accurate index to the mealiness of peas. The determination of alcohol insoluble solids requires considerable time and equipment and is technical and involved; it loses its practical aspect, however, in determining maturity for the higher grades. Therefore, the brine flotation method for determination of maturity has been developed and should be used in scoring this factor unless the maturity is a borderline case between U. S. GRADE C and OFF-GRADE. The Federal Food, Drug, and Cosmetic Act has defined early type peas as excessively mealy if they contain more than 23.5 percent of alcohol insoluble solids and in the case of sweet peas if they contain more than 21 percent of alcohol insoluble solids.

(43)

Under no circumstances should a certificate on peas be issued unless either the alcohol insoluble solids have been determined by an AMS laboratory or a brine flotation has been made by the individual grader. Do not rely on a chewing test in scoring this factor.

(44)

"Ruptured peas" are peas the skins of which are split to a width of 1/16 inch or more. Peas that are ruptured to this extent are usually due to maturity. In scoring "ruptured peas", however, any pea that is split to 1/16 inch or more is considered a "ruotured pea". Peas used for the brine flotation test should not include any ruptured peas or peas that have other breaks or cracks in the skin.

(45)

In the (C) classification for maturity, mention is made that not less than "90 percent by count of peas are crushed by a weight of not more than 907.2 grams (2 pounds)". Since most laboratories are not equipped to make this determination, this pressure test need not be applied. Usually peas that will not meet this requirement fall below the standard of quality in some other respect.

(46)

All graders are required to use the brine flotation method to determine the score for the factor of maturity. Results should be recorded on the reverse side of the score sheet. The brine flotation method is covered by the handbook article entitled "Determinations of Maturity by Brine Flotations" but to insure uniform results the following procedure should be practiced.

(47)

The percent salt solutions mentioned in the grades are percentages by weight and such brines must be used at the standard temperature of 68° F. because their densities vary with the temperature. For example, a solution of 13% salt at 90° F. is only as dense as one of 12% at 60° F.

(48)

The important characteristics of these brines is not the percentage composition by weight, but the density, since we are dealing with the density test on canned peas. In order to avoid all variations

(49)

due to temperature it is best to check brine by a salometer at the time it is used. Regardless of the brine temperature, the salometer spindle readings correspond exactly in density to the percent solutions mentioned in the F.D... grades.

The most common error occurs in preparing brine solutions in advance without rechecking. A brine made with cold tap water may readily become 20° to 30° F. warmer before it is used, with the result that its density becomes far too weak. Likewise, brine allowed to cool will increase in density.

(50)

By the use of a few simple rules inspectors should be able to obtain uniform and accurate results with the brine test.

(51)

(1) Use salometers graduated in percent salt. There are salometers graduated from 0 to 26% and calibrated for 68° F. The salometers should be checked from time to time against each other if several instruments are on hand, or the canner can at any time check a salometer with that carried by the inspector when he visits the plant. Salometers should be kept clean at all times.

(52)

(2) When taking readings, be sure the salometer floats freely in the brine and does not touch the sides of the vessel. Most accurate readings are taken when the eyes are slightly below the surface of the liquid. If any foam adheres on the surface of the liquid, it should be removed before taking the reading.

(53)

(3) Always check the strength of the brine immediately prior to being used. If this is done, temperature may be disregarded; however, the use of either extremely warm or extremely cold solution should be avoided.

(54)

(4) Never grade excessively cold peas - they should be brought to room temperature.

(55)

(5) Brines become diluted quickly. Remove as much adhering moisture from the peas as possible before testing. This is done best by first pouring all the liquor from the peas before placing into the grading tray and then handling the peas with the hands immediately prior to placing into the grading brine.

(56)

Brines should be rechecked and adjusted, if necessary, after approximately every third flotation. The brine may be adjusted by adding small amounts of saturated salt solution or water until the proper salometer reading is obtainable, mixing well after each addition. Frequently for speed in grading, considerable quantities of different strength brine solution are prepared immediately before grading, and new solutions taken instead of making adjustment.

(57)

(6) The reading of peas that sink should be taken as soon as a definite separation occurs. This usually requires approximately 10 seconds. The peas that remain in suspension are regarded as floaters. Avoid using a sample of too many peas - 10 or 20 peas give best results.

(58)

(7) The sample should exclude all broken or mashed peas or peas with occluded air under the skin. Samples should be taken at random from the grading tray and should include peas from the top, center, and bottom of the can.

(59)

(8) Peas take up salt brine very rapidly; therefore, a single (60)
sample should never be used for more than one flotation test.

(9) Avoid grading immediately after packing. If possible at (61)
least two days should elapse after packing before grading.

The factor of maturity is scored in accordance with the following (62)
table which indicates the maximum tolerances allowed for peas that sink
in the respective solutions.

[illegible]

- (*) If more than 35% by count are ruptured, the peas shall be scored in this classification and shall be certified as Off-Grade, together with the statement - "Below Standard in quality - Excessive Cracked Peas". (63)

Careful consideration has been given to the matter of making alcohol insoluble solids test on canned peas. If more than 10 percent by count of sweet type peas sink in a 15 percent brine solution, or if more than 10 percent by count of early type peas sink in a 16 percent brine solution, it will be necessary to make an alcohol insoluble solids test to determine if the peas are above or below the Standard of Quality promulgated under the Federal Food, Drug, and Cosmetic Act. (64)

When application for grading of canned peas is made, it is reasonable to assume that the applicant's request for grading authorizes any necessary expense incurred in inspecting the product accurately. Therefore, in cases where it is necessary, the alcohol insoluble solids test can be made without the prior permission of the applicant. Certificates and fee bills covering inspections of this nature should carry the additional charge of \$2.00 for each alcohol insoluble solids test made. (65)

Usually composite samples may be used in making the alcohol insoluble solids test. Tests on single cans may be necessary, however, when wide variations in maturity are apparent in a single lot of samples. (67)

It will be necessary for those offices not equipped to determine alcohol insoluble solids to forward samples to San Francisco, Chicago, Philadelphia, or Washington, whichever is more convenient. Composite samples of the peas examined may be repacked and forwarded for the test, or, if necessary, additional samples of the same lot may be drawn.

Not less than ten ounces of peas covered with packing medium should be forwarded for the test. In the event the transportation time to the office where the test is to be made is normally not more than twenty-four hours, the samples need not be sterilized but can simply be forwarded in a tightly closed glass jar. (68)

When the alcohol insoluble solids test is made in some office other than the office certifying the quality of the peas, inspection certificates should report the results of the test and carry under "Remarks" a sentence such as the following: "Alcohol insoluble solids determined in the laboratories of the Food Distribution Administration, Washington, D. C." (69)

TOLERANCE FOR CERTIFICATION OF OFFICIALLY DRAWN SAMPLES

When certifying samples which have been officially drawn and which represent a specific lot of canned peas, the grade will be determined by averaging the score of all containers, provided not more than one-sixth of the containers fail in some respect to meet the requirements of the grade indicated by the average score. (70)

However, none of the containers may fall more than 4 points below the minimum score for the grade indicated by the average score, and if one-sixth or less of the containers fail to meet requirements of the (71)

indicated grade by reason of a limiting rule, the average score of all containers for the limiting factor must be within the range for the grade indicated by the average total score.

This tolerance does not apply if any container falls below any applicable standard of quality promulgated under the Federal Food, Drug, and Cosmetic Act.

(72)

CERTIFICATION OF PEAS "BELOW STANDARD IN QUALITY"

If canned peas fall below U. S. Grade C or U. S. Standard, the inspector must determine whether the product meets the standard of quality promulgated under the Federal Food, Drug, and Cosmetic Act. If the product fails to meet the requirements of this standard, the grade statement "Below Standard in Quality" together with the reason, such as "Excessive Broken Peas", "Excessively Mealy".

(73)

The following table lists the requirements of the standard of quality under the Federal Food, Drug, and Cosmetic Act, together with the respective statement to be used in the event the product fails to comply with these requirements.

(74)

<u>Requirements of Standard of Quality</u>	
(1) Not more than 4 percent by count of the peas in the container are spotted or otherwise discolored;	: "Excessive Discolored Peas"
(2) Standard canned peas are normally colored, not artificially colored;	: "Artificially Colored"
(3) The combined weight of pea pods and other harmless extraneous vegetable material is not more than one-half of one percent of the drained weight of peas in the container;	: "Excessive Foreign Material"
(4) The weight of pieces of peas is not more than 10 percent of the drained weight of peas in the container;	: "Excessive Broken Peas"
(5) The skins of not more than 25 percent by count of the peas in the container are ruptured to a width of 1/16 inch or more;	: "Excessive Cracked Peas"
(6) Not less than 90 percent by count of the peas in the container are crushed by a weight of not more than 907.2 grams (2 pounds); and	: "Not Tender"
(7) The alcohol-insoluble solids of Alaska or other smooth skin varieties of peas in the container are not more than 23.5 percent and of sweet, wrinkled varieties, not more than 21 percent.	: "Excessively Mealy"